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## GEOLOGY AND PALÆONTOLOGY.

RODENTIA OF THE EUROPEAN TERTIARIES.<sup>1</sup>—In this important monograph of 161 pages M. Schlosser has given us a much needed account of a series of Mammalia which has been hitherto much neglected. Comparatively little information as to the character of many of the European genera has been accessible hitherto, and we therefore welcome this work as filling an important hiatus in our literature. The greater number of the extinct species of Europe belong to the Hystricomorpha and the Sciuromorpha; and in the former suborder the important family of the Theridomyidæ is especially characteristic of that continent. To it M. Schlosser refers the genera *Theridomys* Blv. *Protechimys* g. n., *Archæomys* L. and P., and *Trechomys* Lart., which M. Schlosser remodels. The total number of species belonging to this family recognized, is fifteen. An important new genus is added to the Hystricomorpha, *Nesokerodon* Schloss., with two species from the French Phosphorites. Considerable attention is given in the monograph to the rooting of the molar teeth. The book is well illustrated with eight 4to plates.

A few blemishes appear in the text, such as the printing of the synonyms separately and in the same type as the correct names of the species. Also there is a good deal of confusion in the names and authorities which are quoted from the American literature of the subject.

MARSH ON AMERICAN JURASSIC DINOSAURIA,<sup>2</sup> PART VIII.—In introducing the description of the principal characters of the skeleton of the carnivorous Dinosauria Professor Marsh remarks that, "Although much has been written about these reptiles since Buckland described *Megalosaurus* in 1824, but little has really been made out in regard to the structure of the skull, and many portions of the skeleton still remain to be determined." This being the fact, "the fortunate discovery of two nearly perfect skeletons of this order, as well as a number of others with various important parts of the skeleton in good preservation, has afforded the writer an opportunity to investigate the group." The best preserved remains belong to species of *Allosaurus* and *Ceratosaurus*. The latter genus proves to be one of the most curious of the Dinosauria. Marsh finds that the bones of the pelvis are coössified as in birds; and in a subsequent article (*l. c.*) that the metatarsals are coössified also, giving a metapodium a good deal like that of a penguin. These facts quite close the argument in favor of the descent of the birds from the Dinosauria, although

<sup>1</sup> Die Nager des Europäischen Tertiärs nebst Betrachtungen ü. d. Organisation u. gesch. Entwicklung der Nager überhaupt; von M. Schlosser: *Palæontographica*, July, 1884.

<sup>2</sup> The principal characters of American Jurassic Dinosaurs, Part VIII, order Theropoda. On the United Metatarsal bones of *Ceratosaurus*. *Amer. Jour. Sci. Arts*, 1884, Pt. I, 329; Pt. II, p. 161.

in some of the pelvic characters we must, according to Baur, look to the herbivorous forms for the closest resemblance. The cervical vertebræ of *Ceratosaurus* have a very peculiar articulation, being deeply concave posteriorly and plane in front, thus preventing the reception of the anterior face deeply into the posterior face of the centrum in front. The depth of its shallow entrance is marked by a ledge on the sides of the anterior face. The skull of *Ceratosaurus* is peculiar, according to Marsh, in the large anteorbital opening.

Professor Marsh separates *Ceratosaurus* as type of a family distinct from the *Megalosauridæ*, but it does not appear from his diagnosis of the latter on what grounds. The only distinctive character given to the former is "horn on skull," which is certainly of not more than generic value, and may not even be that. The skeleton of the *Megalosauridæ* is little known, but it is probable that the *Ceratosauridæ* must be distinguished from them by the coössified metatarsals and pelvic bones. The other distinct family appears from Marsh's definitions to be the *Zancloodontidæ*, where the cervical vertebræ are biconcave, and the pubes different. I have elsewhere<sup>1</sup> referred to Professor Marsh's tendency to exaggerate the systematic value of various characters,<sup>2</sup> and reiterate the opinion that his "orders" are of no higher rank than suborders.

As usual, Professor Marsh omits the customary reference to facts already determined by others. Thus he states that some of these reptiles probably rested on the free extremities of the pelvis in a sitting posture (p. 336). The writer pointed out this peculiarity as long ago as 1870.<sup>3</sup> Professor Marsh also finds (p. 337) that the presence of various genera of Dinosaurs, closely allied to these American forms, in essentially one horizon in the Isle of Wight, suggests that the beds in which they occur are not Wealden as generally supposed, but Jurassic. The American beds were at first referred to the Wealden by Marsh, and subsequently to the Jurassic by the writer in "Relations of the Horizons of Extinct Vertebrata of Europe and North America."<sup>4</sup>

This paper is well illustrated by six plates.—*E. D. Cope.*

<sup>1</sup> Proceedings Academy Philada., 1883, p. 97, on the structure of the skull in the *Hadrosauridæ*.

<sup>2</sup> Another illustration of this is seen in a short article by Professor Marsh immediately succeeding the first one now reviewed, "On a New Order of Extinct Jurassic Reptiles, *Macelleognatha*." This supposed order reposes on a symphyseal portion of a ramus which looks like the corresponding part in various reptiles, and which is edentulous at its extremity. The absence of teeth or of a few teeth, does not constitute an ordinal character; so that this name must be ranged with those of *Sauranodontia* and *Pteranodontia* of the same author, as unnecessary additions to nomenclature.

<sup>3</sup> Extinct Batrachia Reptilia and Aves N. America, p. 122 E.

<sup>4</sup> Report of the Proceedings Congress Geologists, Paris; Bulletin U. S. Geol. Surv. Terrs. Vol. v.

THE EOCENE OF NORTH CAROLINA.—I have recently ascertained by the discovery of the unmistakable superposition of the small outlines of Eocene fossiliferous rocks (noted in the text and geological map of the State, in the report of 1875), and of other similarly situated patches of the same beds, with upper Eocene shells, capping the highest hills of the so-called drift or quaternary, that nearly all of these beds of sand and gravels heretofore referred to the latter horizon are of Eocene age. The area of Tertiaries in this State must now be extended over a wide stretch of country, from the tops of Laurentian hills, near Raleigh, and the higher elevations of the Huronian slates, to from fifty to seventy-five miles south-eastward, along the course of the Deep river, and so onward to the South Carolina border, reaching at one point an elevation of 600 feet above tide. This leaves the quaternary, like the Miocene, to be represented by a thin and broken covering of superficial deposits, of only a few feet to a few yards in thickness, and reaching from the coast only about 100 miles inland and an elevation but little above 100 feet.—*W. C. Kerr, Raleigh, N. C.*

CHARACTER OF THE DEEP-SEA DEPOSITS OFF THE EASTERN COAST OF THE UNITED STATES.—At the Newport meeting of the National Academy of Sciences, Professor A. E. Verrill gave the results of explorations made last summer by the U. S. Fish Commission steamer *Albatross*, sixty-nine dredgings having been made during four trips between Wood's Holl and a point off the Virginian coast. Of these dredgings, 5 were in depths between 2000 and 2600 fathoms (4 successful); 20 were between 1000 and 2000 fathoms; 24 between 500 and 1000 fathoms; 8 between 300 and 500 fathoms; 12 between 75 and 300 fathoms. Another trip has since been made to explore more extensively the zone between 40 and 100 fathoms.

Some very interesting and important discoveries were made in regard to the nature of the materials composing the sea-bottom under the Gulf stream at great depths. These observations are of great interest from a geological point of view, and some of them are contrary to the experience of other expeditions, and not in accordance with the generally accepted theories of the nature of the deposits far from land. The bottom between 600 and 2000 fathoms, in other regions, has generally been found to consist mainly of "globigerina ooze," or, as in some parts of the West Indian seas, of a mixture of globigerina and pteropod ooze. Off our northern coasts, however, although there is a more or less impure globigerina ooze at such depths, at most localities beneath the gulf stream this is by no means always the case. The ooze is always mixed with some mud and sand, and frequently with much clay-mud. In a number of instances the bottom at depths below 1000 fathoms has been found to consist of tough and compact clay, so thoroughly hardened that many

large angular masses, sometimes weighing more than fifty pounds, have been brought up in the trawl, and have not been washed away appreciably, notwithstanding the rapidity with which they have been drawn up through about two miles of water. In fact these masses of hard clay resemble large angular blocks of stone, but when cut with a knife they have a consistency somewhat like hard castile soap, and in sections are mottled with lighter and darker tints of dull green, olive, and bluish gray. When dried they develop cracks, and break up into angular fragments. This material is genuine clay, mixed with more or less sand, showing under the microscope grains of quartz and feldspar, with some scales of mica. More or less of the shells of globigerina and other foraminifera are contained in the clay, but they make up a very small percentage of the material.

In all our ten localities, between 2000 and 3000 fathoms, the bottom has been "globigerina ooze." We have never met with the "red clay" which ought to occur at such depths, according to the observations made on the cruise of the *Challenger*.

The temperatures observed with the improved thermometers now used on the *Albatross* were between  $36.4^{\circ}$  and  $37.0^{\circ}$  F., in 2000 to 2600 fathoms. But temperatures essentially the same as these were also taken in 1000 to 1500 fathoms, and even in 965 fathoms one observation gave  $36.8^{\circ}$  F. It follows from these observations that nearly the minimum temperature is reached at about 1000 fathoms in this region.

GEOLOGICAL NEWS.—*General*.—The water of the Atlantic, Indian ocean, Red sea, and eastern part of the Mediterranean, has been shown by M. Dieulafait to contain manganese. The manganese can scarcely be perceived in sediments consisting of suspended matter, but is very perceptible when the water is free from suspended particles. In this way the well-known concretions of manganese in the deep seas were accounted for. He concludes that one of the conditions for the formation of chalk is the absence of foreign substances, and thus it may be expected that chalk should generally be rich in manganese. It was found that the quantity of manganese in fifty-six specimens of chalk from the Paris basin was fifty times more than in specimens of granular colored limestone.

*Archean*.—M. Barrois calls attention, in his notes on metamorphic rocks of Morbihan, to the way in which the schists gradually lose their crystalline character as they recede from the granite, until at length they pass into slate; while the metamorphic sandstones also change as they approach the granite, so as to show four distinct stages.

*Devonian*.—M. Paul Vernskoff has published an important memoir upon the Devonian deposits of Russia, comprising: (1) their geographical distribution in the centre and north-west of that

country; (2) a historical account of investigations of these deposits; (3) a description of their structure, and (4) a comparison of the Devonian of Russia with that of western Europe. The author concludes that the lower stages of the Devonian are lacking in Russia, which has only the middle and upper stages.

*Carboniferous.*—M. Fuchs has brought together abundant details respecting the geology of Cochin China and Tonkin. The carboniferous limestone is particularly well-developed, is of crystalline structure, and generally gray or blackish in tint. These rocks are violently dislocated in Tonkin and at Tourane, and form crenellated inaccessible cliffs of most picturesque shape. The islets and reefs which border the northern coast of the Gulf of Tonkin, and which have for centuries been the refuge of pirates, are formed of this rock. Upon these limestones rest beds of clay-sandstones with layers of coal at their base. These beds spread over large areas, and are certainly more than a thousand meters in thickness. Some twenty species of plants, some new, others like European coal measures, have been described. M. Fuchs then describes the coal basin of Tonkin, which forms a belt about 111 kilometers long, parallel with the coast. Only the southern border of this has been explored. The best known coal regions of Tonkin are those of Hon-Gac and of Ke-Bac. Analysis has proved that the coals of Tonkin are combustibles of good quality, adapted to diverse industrial uses.—W. Dames in remarks upon the supposed “Phyllopod” nature of *Spathiocaris*, *Aptychopsis* and similar bodies, maintains that some of these are undoubtedly goniatites, and that others cannot at present be interpreted, but that among these last none are phyllopodous.

*Permian.*—M. A. Gaudry announces that the study of *Euchirosaurus* has been facilitated by that of portions of *Archegosaurus* which have recently been found. *Euchirosaurus* possessed an abdominal cuirass, and was capable of powerful lateral motion, so that it was truly a reptile, progressing in reptilian fashion. The scales of the cuirass were very hard, and the vertebræ had neural spines which not only had lateral processes like those of several American species, but was also furnished with articular facets so as to be slightly movable upon the centrum.

*Jurassic.*—M. De Loriol continues, in the *Palæontologie Française*, the publication of his monograph of the Jurassic crinoids of France. Sixty-four species of *Millericrinus* alone have been described from the Jurassic beds, and twenty-six of these are new. All but four of the known species of this genus have now been found in France. No modern species recalls in the least this form of crinoid, with its pyriform or even globular calyx mounted on a long stem fixed by numerous tendrils.—M. Cotteau, in a memoir of the echini found in the limestones of the celebrated locality of Stramberg, in the Carpathians, enumerates twenty-

eight species, of which five are new, while the others have all been found in the Corallian or Kimmeridgian of other localities. The beds are thus proved to be Upper Jurassic.—In the specimen of *Archæopteryx* in the Berlin Museum, those parts are preserved which are wanting in the example in the British Museum, and the pelvis, hind-limbs, and more perfect tail supply valuable details. These are worked up in the memoir “*Ueber Archæopteryx*” in the *Palaeontologische Abhandlungen*, Berlin, 1884, by W. Dames.

*Cretaceous*.—The variability of ancient species is well demonstrated by five abnormal specimens of *Hemiastr* from the cretaceous of Constantine, Algeria. In some of these one of the ambulacral areas is entirely or partially atrophied, while in others there is a doubling of one of the ambulacra. These animals, provided with four or six ambulacra, attained as full a growth as normal examples.

*Tertiary*.—The series of tertiary deposits which lie along the Alsatian slope of the Vosges, and which are often rich in bitumen, have by M. Blecher been determined to belong to the TONGRIAN stage. The deposits are sometimes marly and of deep-sea origin, at others sandy and littoral, according to the widening or narrowing of the zone between the Vosges and the Black forest. The vegetable fossils are numerous and remarkable.—M. Pomel considers the terrestrial deposits of the Sahara as forming two categories. The more ancient he places in the *pliocene*, and names *Saharian*. The author endeavors to show that, during the *pliocene* and *quaternary*, the maximum zone of precipitation was displaced northwards, and successively passed from the central Sahara to the Atlas, then to central, and lastly to northern Europe.

#### BOTANY.<sup>1</sup>

THE FERTILIZATION OF THE MULLEIN FOXGLOVE (*SEYMERIA MACROPHYLLA*).—The mullein foxglove is similar to the passion flower of Ohio in flowering for only one day. Both begin to flower early in the morning. *Seymeria* perishes with nightfall, the passion flower lasts till about midnight. The *Seymeria* is of a yellow color, has but a short tube and is wide at the mouth. Were it not for the numerous hairs in the throat of the tube, it would be of easy access to all classes of insects. The lower hairs seem to be in decided disorder, while those on the upper parts of the tube all point to the entrance. They serve as guards to the flower, of which the lower part of the throat is incurved so as to bring the tube together at that point. The middle lobe of the lower lip has a series of hairs on either side and between these rows of trichomes is a portion free from them (Fig. 1) so

<sup>1</sup> Edited by PROFESSOR C. E. BESSEY, Lincoln, Nebraska.